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Michela Massimi

Laws of Nature and Nomic Necessity

Was Kant Really a Projectivist?

What did Kant have to say about the lawfulness of nature and the necessity that seemingly goes with our nomic judgments? Like Hume before him, the Critical Kant too saw the *necessity* of our nomic judgments as originating somehow in our mind, or better in the faculty of understanding. Yet a gulf separates Kant from Hume. For Kant's mature view about the lawfulness of nature and the ability of our faculty of understanding to *prescribe laws* to nature brings the discussion about the necessity of our nomic judgments onto an entirely new realm, unknown to his predecessors and hardly acknowledged by contemporary philosophers of science, whose debates on nomic necessity have been polarized between Humeans and Necessitarians.

In this essay, I clarify the nature of the prescribing force that the Critical Kant assigned to the faculty of understanding in explaining nature's lawfulness and the modal necessity that accompanies such move. Most importantly, I clarify what Kant did *not* subscribe to. For there is a widespread and tempting view that for long time has interpreted Kant's view on the lawfulness of nature along projectivist lines. I explain why in my view Kant's bold claim about the understanding prescribing laws to nature should not be understood along the lines of a form of *projectivism* about laws.

1 Nomic judgments, Second Analogy, and nomic necessity in general

In this Section, I investigate Kant's mature view about the lawfulness of nature and take some preliminary steps towards answering the key question about the necessity of the laws of nature, according to Kant. More to the point, my goal here is to raise some questions about an influential but, in my view, ultimately incorrect interpretation of Kant's view that takes the form of *projectivism*.¹

¹ I have discussed and analysed what I take to be Kant's positive view on the lawfulness of nature in Massimi, Michela: *Prescribing Laws to Nature. Part I. Newton, the pre-Critical Kant, and three problems about the lawfulness of nature*. In: *Kant-Studien* 105/4 (2014), 491–508. And

That Kant understood nomic judgments as bringing along with them a kind of necessity that goes over and above mere Humean co-occurrence of events is clear from textual evidence. Take a simple mundane nomic judgment such as “Loadstones attract iron filings”, and consider the counterfactual conditional “If a loadstone had been present, the iron filings would have been attracted”. On a non-sophisticated Humean reading, this counterfactual would simply express the constant conjunction between the event A (i.e. the loadstone being present) and event B (i.e. iron filings being attracted to it), the fact that A precedes B in time and is contiguous to it in space, but with no causal glue in nature connecting events of type B with events of type A.

On a non-sophisticated Humean reading,² all we would be entitled to say is that the impression (and idea) of event A is always followed by the impression (and idea) of event B. Of course, such Humean reading presupposes our ability to have impressions, and form ideas, of both events A and B. Hence, the famous objection against the naïve Humean regularity theory of laws: namely, that it cannot account for uninstantiated laws such as Newton’s first law, for example (i.e. “If no force acts on a material body, the body persists in its state of rest or uniform motion”, whereby the antecedent is typically uninstantiated in nature, and can only be observed in a lab under suitable conditions).

Kant’s view fares better than the non-sophisticated Humean view on this score. For Kant can eschew the objection about uninstantiated laws by conceding upfront that nomic judgments such as “Loadstones attract iron filings” go beyond the (past, present, and future) co-occurrences of two perceived /perceivable events, and involve instead unobservable causal entities (e.g. a “magnetic matter” as he calls it). Indeed, for Kant it is this unobservable causal entity that connects the two events and acts as causal glue between them, even if our senses are not fine enough to discern it. This is what Kant says in the *Analytic of Principles* under the Section on The Postulates of Empirical Thinking in General:

However, one can also cognize the existence of a thing prior to the perception of it, and therefore cognize it comparatively a priori, if only it is connected with some perceptions in accordance with the principles of their empirical connection (the analogies). For in that case, the existence of the thing is still connected with our perceptions in a possible

also in Massimi, Michela: *Grounds, modality, and nomic necessity in the Critical Kant*. In: *Kant and the Laws of Nature*. Ed. Michela Massimi, Angela Breitenbach. Cambridge 2017, 150–170. This essay should then be read in conjunction with, and as complementary to the positive analyses I have already offered in these other two articles.

² This contrast with sophisticated Humean readings of laws of nature as in David, Lewis: *Counterfactuals*. Oxford 1973.

experience, and with the guidance of the analogies we can get from our actual perceptions to the thing in the series of possible perceptions. Thus we cognize the existence of a magnetic matter penetrating all bodies from the perception of attracted iron filings, although an immediate perception of this matter is impossible for us given the constitution of our organs. [...] Thus wherever perception and *whatever is appended to it in accordance with empirical laws reaches*, there too reaches our cognition of the existence of things.³

Kant seems to suggest that our cognition of the existence of things (including unobservable entities such as “magnetic matter”, or else) is made possible (despite our finite limited sensory organs) through the guidance of the Analogies of Experience; in particular through what he calls the “empirical laws” (e.g. the laws of magnetism) that may instantiate the Second Analogy of Experience (causality), for example. Going against a well-trodden Humean tradition that had long warned against taking causal laws as a reliable guide to what there is, Kant seems to be reverting the trend. For he takes the Second Analogy of Experience as a principle that guides our possible experience, our ability to start with perceptions and then make inferences about the existence of things, including unobservable ones, at work in the lawful empirical connection of appearances. But there is more.

Existential claims about unobservable entities afforded by the Second Analogy – Kant clarifies a few pages later – do not carry the mark of the “merely formal and logical necessity in the connection of concepts”. Our ability to infer the existence of “magnetic matter” is not, for Kant, downstream of our concept of loadstone, or of the logical connection between the concept of loadstone and the concept of iron filings that we might have in our mind. Existential claims carry instead the mark of “material necessity in existence”, which was shunned by Hume. With an important caveat, though. Namely, that Kant (like Hume before him) is not arguing for the necessity of the existence of any particular substance *tout court*. Rather, he is arguing for the *material necessity in the relation between causes and effects in nature*. Or better, he is arguing for the necessity through which once we posit the existence of something qua *cause*, the existence of something else qua *effect necessarily* follows. Had the loadstone been present, the iron filings would *necessarily* have been attracted by it:

Now there is no existence that could be cognized as necessary under the condition of other given appearances *except the existence of effects from given causes in accordance with laws of causality*. Thus, it is not the existence of things (substances) but of their state of which alone we can cognize the necessity, and moreover only from other states, which are given in perception, *in accordance with empirical laws of causality*. [...] Hence we cognize only the

3 Kant: KrV, B 273/A 226, emphasis added.

necessity of *effects* in nature, the causes of which are given to us, and the mark of necessity in existence does not reach beyond the field of possible experience [...]. Necessity therefore concerns only the relations of appearances in accordance with the dynamical law of causality, and the possibility grounded upon it of inferring a priori some given existence (a cause) to another existence (the effect).⁴

It is clear from this passage how Kant regarded the cause–effect relation expressed by the Second Analogy of Experience as bringing along with it a “mark of necessity”. Kant regarded existential claims from something qua *cause* to something else qua *effect* as necessary because conforming to the “empirical laws of causality”. These in turn conformed to the “dynamical law of causality” (i.e., the Second Analogy) as a template for possible experience, i.e. for our ability to infer from the existence of something as a cause to the existence of something else as its effect. The only necessity we have knowledge of, then, is the necessity that pertains not to substances qua noumena, but to phenomena qua appearances in their lawful, thoroughgoing empirical connections expressed by causal laws.⁵ Here we encounter what I take to be *Kant’s general notion of nomic necessity* as capturing connections between appearances according to empirical causal laws (be it the law of magnetism, or else). In contemporary language, nomic judgments capture counterfactual conditionals of the form “if C had been the case, E would have been the case” because, for Kant, necessity pertains – broadly speaking – to the way in which the Second Analogy guides us in the lawful, thoroughgoing empirical connection of particular appearances to make experience of nature possible for us.

Thus, Kant’s general notion of nomic necessity is strictly related to (and an expression of) his overall take on modality in the Postulates of Empirical Thinking in General. In particular, his general notion of nomic necessity captures the way in which the Postulates operate with respect to the Analogies to make experience of nature possible for us. The principles of modality – Kant makes it clear – “do not in the least augment the concept of which they are asserted in such a way as to add something to the representation of the object”.⁶ Instead, they “add to the concept of a thing (the real), about which they do not otherwise say anything, the *cognitive power whence it arises and has its seat* so that [...] if it is de-

⁴ Kant: KrV, A 227/B 280–A 228, emphases in italics added.

⁵ For a discussion of necessity and the Postulates in relation to Kant’s Refutation of Idealism and the distinction between noumena and phenomena, please see Emundts, Dina: *The Refutation of Idealism and the Distinction between Phenomena and Noumena*. In: *The Cambridge Companion to Kant’s Critique of Pure Reason*. Ed. Paul Guyer. Cambridge 2010, 168–189.

⁶ Kant: KrV, B 286/A 234.

terminated through the connection of perceptions in accordance with concepts, then the object is called *necessary*. The principles of modality therefore do not assert of a concept anything other than the action of the cognitive faculty through which it is generated".⁷ The modal notion of *necessity*, Kant clarifies, does not add anything to the concept of which it is asserted (e.g. the concept of a thing qua effect). Instead it simply adds "*the cognitive power whence it arises and has its seat*, so that, if it is merely connected in the understanding with the formal conditions of experience, its object is called *possible*; if it is in connection with perception [...] and through this determined by means of the understanding, then the object is actual; and if it is determined through the connection of perceptions *in accordance with concepts*, then the object is called *necessary*".⁸

An object (qua effect) is then for Kant *necessary* whenever it is determined through the empirical connection of perceptions in accordance with causality, for example. Were a loadstone present, iron filings would *necessarily* be attracted by it, because our faculty of understanding determines thus-and-so the empirical connection from our perception of the loadstone to the inferential conclusion that iron filings would be moved (and necessarily so). Hence, Kant's general notion of nomic necessity finds home in the general conditions of the possibility of experience laid down by the System of the Principles of Pure Understanding. The lawfulness of nature, in this general broad sense, is nothing but the ability of our faculty of understanding to connect appearances in determinate ways in accordance with principles of the understanding (for example, in accordance with causal concepts). The necessity captured by empirical laws of nature flows from the necessity with which the understanding determines the thoroughgoing connection of appearances in accordance with the Second Analogy of Experience, for example.

When stated thus and so, it would seem that Kant's general notion of nomic necessity does not differ much, after all, from Hume's take on the necessity of the causal connection. In Hume, necessity arises by habit and custom in the human mind that has been exposed several times to the same co-occurrences of events of the same type. In Kant too, it would seem, necessity is borne out of "*the cognitive power whence it arises and has its seat*", in particular our faculty of understanding with its Principles (the Second Analogy of Experience in particular, and the Postulates of Empirical Thinking in General), and their ability to determine the empirical connection of perceptions in specific a priori ways (e.g. the ability to determine how the perception of something qua *cause* is

7 Kant: KrV, A 234/B 287, emphases in italics added.

8 Kant: KrV, A 234, emphases in italics added.

bound to be followed by the perception of something else qua *effect*, so that whenever we perceive an event A our faculty of understanding is able to infer the necessary occurrence of event B, according to causality).

Yet, Kant could not be more at variance from Hume on this issue. For the determination of the connection between perceptions *in accordance with concepts* is in no way akin to the Humean constant conjunction, precedence, and contiguity of impressions (and ideas) of type A with impressions (and ideas) of type B. In knowing a specific spatio-temporal manifold according to cause–effect concepts (e.g. loadstone–iron filings), the faculty of understanding is already going beyond the sheer Humean principle of association of ideas. The faculty of understanding with its concepts, Kant tells us, is instead *prescribing laws to nature itself*.⁹ The cause–effect connection and the necessity that goes with it in nomic judgments is not confined to the way in which perceptions get associated by the human mind, as in Hume. Instead, it has a purchase on nature itself. To put it bluntly, it is not the sheer Humean associative mechanism of our mind to think of event A as a cause of event B that underlies Kant’s analysis of nomic judgements and nomic necessity in this general sense. It is instead our antecedently-held belief that a determinate causal connection exists between event A and event B that allows us to infer that B would occur (and necessarily so, e.g. iron filings being attracted), were A to occur (e.g. were the loadstone present).

The obvious problem with this way of marking the distinction between Kant and Hume is that Kant (but not Hume) needs to tell then a story about what might take us from an antecedently-held belief about causality (e.g. that A causes B) to claims about nature itself (i.e. about a *specific effect* B occurring, and necessarily so, were A to occur). In other words, the burden is on Kant (but not on Hume) to demonstrate that nomic necessity – in this general sense, which finds home in the System of the Principles of Pure Understanding – has indeed a purchase on nature itself. I call this *the Kantian problem of inference* (to distinguish it from the cognate version of the problem that can be found in contemporary philosophy of science surrounding the necessity of laws in Armstrong’s Necessitarian account). And it is to the Kantian problem of inference that I turn my attention next.

⁹ Kant: KrV, B 163.

2 The Kantian problem of inference

Before the aforementioned passages on the Postulates of Empirical Thinking in General in the *Analytic of Principles*, Kant had dealt with the Transcendental Deduction of the pure concepts of the understanding. It is in this context that Kant famously introduced his claim about the categories being concepts that prescribe laws a priori to nature “as the sum total of all appearances (*natura materialiter spectata*)”.¹⁰ Kant then presents what he calls “a riddle” (I am henceforth going to call it *the Kantian problem of inference*).¹¹ Namely, why must nature follow the a priori laws that the understanding prescribe to it? And how could nature possibly do so? Since the categories are not themselves derived from nature, nor do they follow nature’s patterns (otherwise they would be empirical and not a priori), how can they have any purchase on nature itself? I take the Kantian problem of inference to take the following form:

- (I) All alterations occur in accordance with the law of the connection of cause and effect (Second Analogy)
- (II) Event of type A (e.g. presence of a loadstone) causes event of type B (e.g. iron filings being attracted to it – empirical causal law)
- (III) Event A_1 causes event B_1 (e.g. this particular loadstone causes these particular iron filings being attracted – instantiated empirical causal law)
- (IV) A_1 occurs

¹⁰ Kant: KrV, B 163.

¹¹ The terminology “problem of inference” is coined by Bas van Fraassen in his critical treatment of David Armstrong’s Necessitarian account of laws (van Fraassen, Bas: *Laws and Symmetry*. Oxford 1989, 96). The problem of inference is the problem of how to move from a necessitation relation between universal properties such as N (F-ness, G-ness) to the necessitation relation that is supposed to hold at the level of particulars N (Fa, Ga). I borrow the terminology, although it should be clear from the passage below that the Kantian version of the problem of inference concerns how to go from a kind of necessity captured by the Postulates in their determination of the connection of appearances according to the Second Analogy, to the necessity that is supposed to hold in nature between events we come to know about via the Analogies and Postulates. Thus, the Kantian problem of inference is even more pressing than its Armstrongian counterpart because it is the problem of explaining how we infer about lawful events in nature, from antecedently-held beliefs about the thoroughgoing connection of appearances in our faculty of understanding.

(V) B_1 necessarily follows (necessity of effects, via I, II, and III).

The Kantian problem of inference is then the problem of explaining how to go from pure principles of the understanding such as (I) to specific events in nature (i.e. V) via type–token empirical causal laws (II and III).¹² Two preliminary remarks are in order.

First, please note that the conclusion of this inference (V) is not an *expectation* that B_1 will occur; but rather, the necessary occurrence of event B_1 given the occurrence of event A_1 and empirical causal laws II and III. Note that Kant is not saying that upon observing A_1 the mind forms the *expectation* that B_1 will occur. He is making a stronger modal claim: namely that once A_1 is posited, B_1 *necessarily* follows. Were the loadstone present, the iron filings would *necessarily* be attracted by it. The occurrence of the effect is *necessary* – Kant argues – because the causal connection between A_1 and B_1 conforms to the laws of the understanding (I) and the way in which they *modally* determine the connection between appearances, i.e. the two events A and B (via empirical causal type-token laws II and III). Should A_1 occur, its effect B_1 would *necessarily* follow, in accordance with the law of causality. Kant can then claim that the necessity of the effect is due to “the cognitive power whence it arises and has its seat”,¹³ namely the faculty of understanding and its Principles (e.g. Second Analogy). It is via this inference from (I) to (V) – I contend – that Kant argues that the categories are concepts that *prescribe* laws a priori to nature.

Second, the passage from (I) to (II) should not be understood as a deduction. Kant clarifies that

Particular laws, because they concern empirically determined appearances, *cannot* be *completely derived* from the categories, although they all stand under them. Experience must be added in order to come to know particular laws *at all*; but about experience in general, and about what can be cognized as an object of experience, only those *a priori* laws offer instruction.¹⁴

¹² I have discussed in detail the Kantian problem of inference in Massimi, Michela: *Grounds, modality, and nomic necessity in the Critical Kant*. In: *Kant and the Laws of Nature*. Ed. Michela Massimi, Angela Breitenbach. Cambridge 2017, which the interested reader is kindly referred to. Here, I supplement my discussion of the problem with a critical analysis of a tempting (but in my view ultimately incorrect) solution to the Kantian problem of inference.

¹³ Kant: KrV, A 234.

¹⁴ Kant: KrV, B 165.

Empirical laws, and this particular causal law among them (II), cannot be derived from the Second Analogy of Experience.¹⁵ Instead, as Kant puts it, empirical causal laws simply “stand under” the Second Analogy. I have suggested elsewhere that we see (II) as an instantiation of the general cause-effect template captured by the Second Analogy (I), pretty much as (III) is an instantiation of (II), in turn. Experience plays a key role in our knowledge of these different instantiations. We need sensory experience to ‘fill in’ the cause-effect template offered by the Second Analogy in as many ways as there are empirical causal laws that “stand under” the umbrella of the Second Analogy – be they laws of magnetism, laws of electricity, laws of mechanics, and so forth. The Second Analogy would then provide the general template for thinking of events as causally connected, under which stand many empirical causal connections instantiated by particular causal laws, which in turn find their instantiation in token occurrences in nature.

However, the problem of how to interpret this overall inference and Kant’s puzzling claim that the understanding prescribes laws a priori to nature remains. What remains puzzling is the heterogeneity between the premises (I–III) and the conclusion (V). For (V) is a claim about nature and the necessity of effects in nature, whereas (I–III) are claims about an a priori principle of the faculty of understanding, and its empirical lawful instantiations, respectively. Leaving here aside the question of how to understand the passage from (I) to (V),¹⁶ my main concern in the rest of this essay is to critically discuss a very influential reading of this problem (although the problem is never quite presented in the way I elucidated here above). I turn to this influential reading in the next section.

3 A tempting, but ultimately incorrect reading: *projectivism*

Here is a possible (but in my view, ultimately, incorrect) solution to the Kantian problem of inference. Kant might be understood as subscribing to a form of pro-

¹⁵ I thus depart from Friedman’s influential reading of Kant’s Second Analogy as being tightened with empirical causal laws as constitutive a priori laws. See Friedman, Michael: *Causal Laws and the foundations of natural science*. In: *The Cambridge Companion to Kant*. Ed. Paul Guyer. Cambridge 1992, 161–199.

¹⁶ I have given an answer to this question on Kant’s behalf in Massimi, Michela: *Grounds, modality, and nomic necessity in the Critical Kant*. In: *Kant and the Laws of Nature*. Ed. Michela Massimi, Angela Breitenbach. Cambridge 2017, 150–170.

jectivism about laws, like Hume on causation has been read along projectivist lines.¹⁷ A projectivist reading of Kant would have it that the above inference is neither mysterious nor puzzling. Instead, it can easily be read as the ability of our mind (in particular of our faculty of understanding) to project the causal connection (licensed by the Second Analogy) between *appearances* of type A and *appearances* of type B onto specific occurrences of A_1 and B_1 . In other words, we would project our inferential attitudes towards A and B onto nature, and assert that A and B are indeed causally connected (and necessarily so) because our faculty of understanding takes A and B as causally connected (and necessarily so). Thus, on this projectivist reading, nature is lawful because the causal structure of nature (or the order of nature that one may want to call it), would be a projection of our faculty of understanding (with its principles), without which nature could not become an object of possible experience for us. Nature cannot be but lawful, given our cognitive ability of thinking of nature as causally connected in the first instance.¹⁸

An influential projectivist reading of Kant (although not exactly engaging with what I called the Kantian problem of inference) has also been put forward by Philip Kitcher.¹⁹ Kitcher's projectivism is meant to reconcile Kant's riddle that the understanding prescribes laws to "nature in general" (but has to resort to experience to learn "special laws"), with Kant's other claim that laws of nature are in some sense necessary. Kitcher argues that we cannot come to know laws of nature either a priori or from experience (otherwise they would not be necessary). Hence, Kant needs to give an alternative account, which ultimately resorts to

17 See Beebe, Helen: *Hume on Causation. The Projectivist Interpretation*. In: *Causation, Physics and the constitution of reality*. Eds. Huw Price, Richard Corry. Oxford 2007, 224–249.

18 For example Juliet Floyd can be read along projectivist lines: "Kant is arguing here that the Critique of Pure Reason leaves room for a certain form of skepticism, namely the possibility that the system of empirical laws governing nature might be so complex and heterogeneous that our faculty of cognition could never place our particular, given experiences into any coherent system. [...] We may know a priori that every event has some cause or other, as Kant argued in the Second Analogy of Experience in the first Critique. But this law of appearances in no way guarantees that we shall be able to determine particular causes of particular events or that we shall be able to find empirical regularities supporting appropriately predictive generalization and the explanation of causal relations in particular cases. In the third Critique Kant [...] is preparing to formulate not merely a more complex conception of empirical regularity than he had in the first Critique, but with it a more sophisticated conception of human judgment itself" Floyd, Juliet: *The Fact of Judgment: The Kantian Response to the Humean Condition*. In: *From Kant to Davidson: Philosophy and the idea of the Transcendental*. Ed. Jeff Malpas. London 2003, 22–47, 26.

19 Kitcher, Philip: *Projecting the Order of Nature*. In: *Kant's Philosophy of Material Nature*. Ed. Robert Butts. Dordrecht 1986, 201–235.

the “introduction of new pieces of critical machinery”, in particular the principle of systematic unity as a principle of reason:

Thus we achieve the outline of a Kantian theory about law, causes, and natural necessities. As the result of the demands of inquiry, demands that are not separable from the naïve suggestion that science aims at the truth, we are prepared to project an order of nature. Laws are statements that play a particular role in the system that would emerge from an ideally extended inquiry.²⁰

On this reading, the Appendix to the Transcendental Dialectic with the principle of systematicity completes the work of the Second Analogy by distinguishing between accidentally true universal generalizations and lawlike ones, depending on whether “they play a particular role in the systematization of belief”.²¹ One of the motivations for Kitcher’s projectivist reading is that the necessity of the laws cannot attach to the regularities corresponding to particular laws of nature. More to the point, Kitcher offers a somehow naturalized analysis of how we come to have the ability to make causal judgments, not through any explicit process of systematizing and unifying beliefs. Instead “we absorb from our predecessors the order of nature that they have projected, so that, from the beginning of our own discussions of the world of experience, we tacitly operate with claims about causal dependencies and natural kinds that have been generated by the systems of our ancestors. Our justifications are thus parasitic on the history of attempts to construct a systematic unification of human experience”.²²

Much as I am sympathetic with the naturalized reading of Kant that Kitcher has offered,²³ it is worth noting two salient aspects behind this projectivist reading. First, the projectivist reading seems to be motivated by the perceived lack of resources internal to Kant’s *System of the Principles of Pure Understanding* to square the circle between the necessity of the laws, the apriority of the understanding and the input from experience that Kant explicitly admits as key for deriving particular laws of nature. Kitcher’s projectivist reading takes as its starting point a view of laws of nature as capturing regularities that lack the mark of necessity. Second, since necessity is key to causal judgments and to laws of nature

²⁰ Kitcher, Philip: *Projecting the Order of Nature*. In: *Kant’s Philosophy of Material Nature*. Ed. Robert Butts. Dordrecht 1986, 201–235, 214.

²¹ Kitcher, Philip: *Projecting the Order of Nature*. In: *Kant’s Philosophy of Material Nature*. Ed. Robert Butts. Dordrecht 1986, 201–235, 221.

²² Kitcher, Philip: *Projecting the Order of Nature*. In: *Kant’s Philosophy of Material Nature*. Ed. Robert Butts. Dordrecht 1986, 201–235, 222.

²³ I have myself offered a naturalized reading of Kantian kinds elsewhere, see Massimi, Michela: *Natural Kinds and Naturalised Kantianism*. In: *Noûs* 48 (2014), 416–449.

(as Kant admits), the projectivist reading enjoins us to look for these modal resources outside the System of the Principles (namely, in the faculty of reason and its principle of systematicity).

I leave here aside the question as to whether textual evidence supports the first point.²⁴ Instead, it is worth noting that the starting point of the projectivist interpretation takes laws of nature as akin to Humean regularities and supplements these quasi-Humean regularities with the demand for systematicity (pretty much as the sophisticated Mill-Ramsey-Lewis view supplements the naïve Humean regularity theory by invoking a Best System of Lawhood). However, it is well known that Mill-Ramsey-Lewis regularities too lack the robust necessity that we tend to associate with laws of nature.²⁵

By the same token, regularities supplemented by the principle of systematic unity would lack the necessity that Kant sees as key to laws of nature, in my view. It is a mystery, and certainly one that Kant might have hinted at and never really explained, how being embedded into a unified system can ever bestow necessity upon particular empirical laws. Kant's discussion of this point in the First Introduction and the Published Introduction of the third Critique are at the center of an extensive literature that I cannot even begin to discuss here, because it will take me far astray from the purpose of this essay. Suffice to say that a projectivist reading of Kant that appeals to systematicity would need to tell a story (and a convincing one) as to how nomic necessity can ever be retrieved from the sheer logical entailment with which one empirical law follows from another one in a best systematized body of knowledge. For the logical entailment of Newton's law of gravity from Newton's second law does not make Newton's law of gravity more modally robust than giving a Humean regularity the honorific title of "law" in virtue of being part of a deductive system.²⁶ Systematicity –

24 Kitcher refers to KrV, A 207/B 252, where I take it that Kant is once again stressing how the Second Analogy provides an *a priori* template for thinking of alteration of states, for which experience offers then specific antecedents and consequents in the form of specific moving forces. Thus, I do not read this passage as forcing upon us a reading of laws of nature as lacking necessity.

25 This is because under the Mill-Ramsey-Lewis account, lawhood is ultimately contingent on the best deductive system in place; the systematization conferred to regularities is, in other words, epistemic, and does not have a purchase on nature itself. It explains why we regard Newton's three laws as laws in our Best System. But it does not explain why nature conforms to Newton's three laws, and necessarily so.

26 Put it differently, systematicity would explain why lawhood is a contingent property: a true universal generalization such as Newton's law of gravity might be a law in world *w* but not in world *z* because only *w* (but not *z*) provides other true generalizations, which makes it a Best System. But when we think of Newton's law of gravity as being necessary, we do not think of

under the projectivist reading – cannot deliver on the promise of nomic necessity because it makes it definitionally equivalent to ‘being implied by other laws in a system’, where the latter cannot explain the former (since it is definitionally equivalent to it):²⁷

It is nomologically necessary that “All As cause Bs” in world *w* iff “All As cause Bs” is implied by other laws in *w*’s system of knowledge.

This might sound brisk as a dismissal of the projectivist interpretation. More to the point, there are resources, I argue, within Kant’s *System of the Principles* to tackle the pressing issue of the necessity of the laws, without having to outsource the problem (and its solution) to systematicity in the Appendix to the *Transcendental Dialectic* and the third Critique. After all, Kant clearly said that it was the faculty of understanding that prescribes laws to nature, not the faculty of reason or the faculty of reflective judgment (despite their important role for the lawfulness of nature). So, it is within the toolkit of the *Transcendental Analytic* that we must look for the resources to answer the quest for nomic necessity. In my view, there is plenty of evidence in the relevant passages of the *Transcendental Analytic* to suggest that Kant did not subscribe to a projectivist interpretation, after all.

4 Three reasons why projectivism fails as a reading

Indeed, tempting as it may sound, the projectivist reading fails to capture three distinctive (*epistemic, metaphysical, and semantic*) features of Kant’s account of laws of nature. First, Kant endorses a clear epistemic view that causal knowledge is a priori: the lawfulness of nature qua *nature in general* rests a priori on the Second Analogy of Experience. In other words, our knowledge of premise (I) in the Kantian inference we saw in Section 2, is a priori. Premise (I) provides the cause–effect template under which all empirical causal laws stand (although they are not completely derived from it without the input from experience). On a

it as necessary here on Planet Earth, but not in the Andromeda galaxy, where a different civilization might have a different system of knowledge, with which Newton’s law of gravity might not fit. In other words, I contend that the lawfulness (understood as a metaphysical feature of why some regularities are indeed laws of nature) has nothing to do with them being part of a system of laws.

²⁷ For a similar criticism of Lewis’s Best System, see van Fraassen, Bas: *Laws and Symmetry*. Oxford 1989, 43–47.

projectivist reading, cause–effect inferences and causal knowledge, more in general, are not a priori, otherwise causal knowledge would reduce to what Kant calls the “subjective predispositions for thinking, implanted in us along with our existence by our author in such a way that their use would agree exactly with the laws of nature along which experience runs”.²⁸

Compare this passage with Kitcher’s aforementioned one: “we absorb from our predecessors the order of nature that they have projected, so that, from the beginning of our own discussions of the world of experience, we tacitly operate with claims about causal dependencies and natural kinds that have been generated by the systems of our ancestors. Our justifications are thus parasitic on the history of attempts to construct a systematic unification of human experience”.²⁹

Under the projectivist reading, the lawfulness of nature would be the outcome of us being predisposed, or hardwired, or able to absorb ‘from our predecessors’ modes of thinking about nature as teaming with causal connections. The lawfulness of nature would not be the outcome of the understanding prescribing a priori laws to nature. Kant firmly rejects this epistemic feature of the projectivist reading and brands it as “a kind of *preformation-system* of pure reason” whereby “no end can be seen to how far one might drive the presupposition of predetermined presuppositions for future judgments”.³⁰ Thus, the projectivist reading seems to fail on explanatory grounds: we cannot *explain* why nature is lawful by simply assuming that we are predisposed (by nature or culture) to think of it as lawful, any more than we can explain why someone is sleepy by assuming she has a predisposition to sleep. Kant seems to suggest that unless we think of cause–effect inferences as a priori (grounded in the Second Analogy as an a priori principle of the understanding, rather than in some subjective predisposition that gets projected onto nature), there is the genuine risk of *infinite epistemic regress* in what needs be presupposed as a predisposition for future judgments. For example, should we discover tomorrow that quantum mechanics allows for backward causation as some philosophers of physics have been arguing for, we would need to revisit our predispositions for thinking of nature as obeying asymmetric cause–effect relations, and add a further predisposition for thinking of nature as obeying instead $[(C \rightarrow E) \text{ OR } (E \rightarrow C)]$.

²⁸ Kant: KrV, B 167.

²⁹ Kitcher, Philip: *Projecting the Order of Nature*. In: *Kant’s Philosophy of Material Nature*. Ed. Robert Butts. Dordrecht 1986, 201–235, 222.

³⁰ Kant: KrV, B 167. – Guyer reads this passage as Kant’s criticism of Hume, although not quite along the lines of the projectivist reading as I have suggested. See Guyer, Paul: *Kant’s Answer to Hume?* In: *Philosophical Topics* 31/1 (2003), 127–164, 143.

But there is more. The projectivist reading falls short of addressing also a salient and related *metaphysical feature* of Kant's account. Causal inferences are a priori, according to Kant, because the necessary connection between cause and effect is grounded in the cause. And not just logically grounded, but *really* grounded. The necessity of the effects follows from Kant's distinctive treatment of causes as *real grounds* for their effects as I have explained in detail elsewhere.³¹ Indeed, in the same aforementioned passage where Kant complains against the "kind of preformation system of pure reason" Kant goes on to argue that any such (broadly projectivist) system would rob the categories of the

necessity that is essential to their concept. For, e.g., the concept of cause, which asserts the necessity of a consequent under a presupposed condition, would be false if it rested only on a subjective necessity, arbitrarily implanted in us, of combining certain empirical representations according to such a rule of relation. I would not be able to say that the effect is combined with the cause in the object (i.e. necessarily), but only that I am so constituted that I cannot think of this representation otherwise than as so connected; which is precisely what the skeptic wishes most, for then all our insight through the supposed objective validity of our judgments is nothing but sheer illusion.³²

It is clear from this passage then that the objective necessity of our causal judgments cannot reside in the ability of our mind to combine empirical representations according to some causal associative rule. Such projectivist strategy of thinking of appearances as causally connected via natural operations of the human mind and its "rule of relation" (or what Hume would call "principle of association") would only result in a subjective necessity, with no bearing on nature itself. The skeptical outcome of such projectivist move is very remote from the objective necessity Kant wishes to secure for nomic judgments of causal kind. Key to objective necessity then is a rejection of the projectivist strategy and the endorsement of a more robust view whereby positing a cause brings along with it the necessity of the effect *in the object*. Such necessity is neither the projection of natural associative operations of the human mind. Nor is it due to our being hardwired, or having absorbed our predecessors' inferential habits of thinking nature as causally connected. The objective necessity through which causes bring about their effects "in the object" – as Kant claims – can only be understood in anti-projectivist terms. It can only be understood if we introduce a metaphysical feature that in my view is pivotal to Kant's account of the lawfulness of nature: namely, thinking of causes as *real grounds* for their effects.

³¹ Massimi, Michela: *Grounds, modality, and nomic necessity in the Critical Kant*. In: *Kant and the Laws of Nature*. Ed. Michela Massimi, Angela Breitenbach. Cambridge 2017, 150 – 170.

³² Kant: KrV, B 168.

We find Kant making claims to this effect since the pre-Critical writings and in the context of some of his earliest discussions about the lawfulness of nature. In the 1763 *The Only Possible Argument*, where he expressly talks about the order and harmony of nature as being the product of causal laws:

Something is subsumed under the order of nature if its existence or its alteration is sufficiently *grounded* in the forces of nature. The first requirement for this is that the force of nature should be the efficient cause of the thing; the second requirement is that the manner in which the force of nature is directed to the production of this effect should itself be sufficiently grounded in a rule of the natural laws of causality. Such events are also called, quite simply, *natural* events of the world.³³

Laws of nature, especially the “natural laws of causality”, govern nature by fixing the ways in which forces and their effects, qua *grounds* and *determinations*, are related. In 1763, Kant for example referred to gravity as “a cause, which is, of necessity, sufficient to produce all these effects” (e.g. give the earth its spherical form, keeps the moon in its orbit, etc.), and uses the terms ‘forces’, ‘causes’, and ‘grounds’ (qua real grounds) interchangeably to motivate an overall account whereby it is the way in which grounds necessarily bring about their determinations that explains the lawful order of nature.³⁴

Finally, there is a third *semantic* reason why Kant’s account of laws is non-projectivist. Under the projectivist reading, we think of events as causally connected (and necessarily so), because we project natural associative operations of the human mind onto nature, but not because we *represent* nature as causally connected (and necessarily so). In other words, causal connection is a matter of inferential projection rather than semantic representation. And for good reasons too: namely, because the projectivist account typically lacks the metaphysical feature I just mentioned, that of thinking of causes as determining their effects (qua real grounds). *Representing* nature as causally connected presupposes causes are connected with their effects “in the object”, rather than in some “rule of relation” in our mind that gets projected onto nature.

Now, Kant fully endorses this anti-projectivist semantic aspect, for he believes that the lawfulness of nature is down to our ability to *represent* nature

³³ Kant: BDG, AA 02: 103.

³⁴ “Now, the fact that grounds are to be found in nature for all these effects is, without doubt, a perfection. And if the same ground which determines the one thing should also be sufficient to determine the others, then the unity which accrues to the whole is so much the greater”. BDG, AA 02: 107. I have analyzed this text in relation to the pre-Critical Kant’s view on the lawfulness of nature in Massimi, Michela: *Prescribing Laws to Nature. Part I. Newton, the pre-Critical Kant, and three problems about the lawfulness of nature*. In: *Kant-Studien* 105/4 (2014), 491–508.

as causally connected (and necessarily so). And this is where the interesting transcendental part of Kant's story comes in. For what we represent are not things in themselves but appearances, and "appearances are only representations of things that exist without cognition of what they might be in themselves".³⁵ Thus, we cannot *represent* real cause–effect connections in nature because we have no epistemic access to them. Kant does not deny the possibility that there might be real cause–effect connections in nature (as the causal realist would maintain). But, even granting that, knowledge of them would be precluded to us.

That Kant allows for the possibility of real cause–effect connections in nature is clear from his allusion to the "lawfulness of things in themselves" that "would necessarily pertain to them even without an understanding that cognizes them".³⁶ But the lawfulness of things in themselves is inaccessible to us. All we can have knowledge of are appearances, and appearances – as mere representations – "stand under no law of connection at all except that which the connecting faculty prescribes". At this point, Kant's anti-projectivist transcendental story becomes fully evident. For Kant contends that

Now that which connects the manifold of sensible intuition is imagination, which depends on understanding for the unity of its intellectual synthesis and on sensibility for the manifoldness of apprehension. Now since all possible perception depends on the synthesis of apprehension, but the latter itself, this empirical synthesis, depends on the transcendental one, thus on the categories, all possible perceptions, hence everything that can ever reach empirical consciousness, i.e. all appearances of nature, as far as their combination is concerned, stand under the categories, on which nature (considered merely as nature in general) depends, as the original ground of its necessary lawfulness (as *natura formaliter spectata*).³⁷

Thus, we *represent* events as causally connected because of the way in which our categories of the understanding perform the transcendental synthesis of the empirical manifold. Via the empirical synthesis of imagination, and subsequently, via the transcendental synthesis operated by the categories of the understanding, appearances get connected so as to deliver *objects of possible experience* (or *phenomena*). Phenomena are then lawful in being causally connected according to the transcendental synthesis operated by the faculty of understanding. Nature, if regarded from a purely formal point of view (i.e. in terms of the conditions of possibility of knowledge displayed by our faculty of understanding –

³⁵ Kant: KrV, B 164.

³⁶ Kant: KrV, B 164.

³⁷ Kant: KrV, B 165.

qua *natura formaliter spectata*) reveals a lawfulness that is inherent in our very own (transcendental) ways of knowing.

This is Kant's anti-projectivist transcendental answer to the baffling question, which we raised and left open in the previous Sections, namely: how can nature possibly follow the a priori laws that the understanding prescribe to it? What purchase can our faculty of understanding possibly have on nature itself? Kant's reply is that nature's lawfulness depends on the faculty of the understanding *because* knowledge of nature is made possible by the principles of the understanding, which ultimately secure and provide the "original ground" for nature's lawfulness. Thus, the lawfulness of nature is not a matter of (paradoxically) mapping our a priori categories onto nature. Nor is it a matter of projecting the inferential habits of our mind (acquired by nature or culture) onto nature. Instead, the lawfulness of nature lies at the very heart of our conditions of possibility of *knowing* nature, as Kant understood those conditions. Asking why nature is lawful is not then asking a distinct and secondary question with respect to the main epistemological question that concerned Kant all along; namely, how knowledge of nature is possible in the first instance. Instead, it is asking this very same question in a disguised form. For grasping the lawfulness of nature is grasping the conditions under which nature becomes an object of possible experience for us.